Title: **GOME2-calibration: Calibration execution procedures**

Prepared by: L. van Riel

Checked by: M. Eschen

Verified by: J. Hopman 2002.08.19

Authorised by: G. Otter 2002.08.21

This document contains proprietary information of TNO-TPD.
All rights reserved.

## DISTRIBUTION LIST

| Others | Copies | TPD | Copies |
|---|---|---|---|
| OG | 1x | Archive | 1x |
| R. Veratti | | Calibration Execution Team | 1x |
| B. Ricciarelli | | | |
| | | | |
| | | | |
| ESA | 1x | | |
| A. Lefèbvre | | | |
| J. Callies | | | |
| | | | |

## DOCUMENT CHANGE RECORD

| Issue | Date | Number of pages | Short description | Pages |
|---|---|---|---|---|
| 1 | 20 September 2000 | 1-23 | First issue | All |
| 2 | 11 March 2002 | | New document | All |
| 3 | See header | See header | FM1 update | ALL |

This document contains proprietary information of TNO-TPD.
All rights reserved.

# Table of Contents

**1. SCOPE ..... 5**

**2. DOCUMENTS AND ACRONYMS ..... 6**

2.1 APPLICABLE DOCUMENTS ..... 6
2.2 REFERENCE DOCUMENTS ..... 6
2.3 ACRONYMS ..... 6

**3. SUPPORTING PROCEDURES APPLICABLE DURING CALIBRATION EXECUTION ..... 8**

3.1 OPERATION AND HANDLING PROCEDURE ..... 8
3.2 EMERGENCY PROCEDURE ..... 8
3.3 ALIGNMENT PROCEDURE STIMULI AND MGSE ..... 8
3.4 OPERATION OF TVC ..... 8
3.5 SWITCH ON/OFF PROCEDURE FOR GOME2 (GAL ATP'S) ..... 8
*3.5.1 Switch on procedure for Gome 2 ..... 8*
*3.5.2 Change_context.tal ..... 10*
*3.5.3 History_decoder.tal ..... 10*
*3.5.4 Switch off procedure for Gome 2 ..... 10*
3.6 GOME2 CONSOLE ..... 10
3.7 RUNNING ATP'S ..... 11
3.8 LOGGING ..... 12
3.9 BACK UP OF DAPB DATA ..... 12
3.10 QUICK LOOK ..... 13

**4. STEP-BY-STEP PROCEDURE ..... 14**

4.1 GENERAL ..... 14
4.2 PREPARATIONS ..... 15
4.3 AMBIENT BLOCK 1 ..... 15
4.4 AMBIENT BLOCK 2 ..... 15
4.5 INSTALL GOME2 IN TVC ..... 16
4.6 TVC/GOME TB2 (NOMINAL TEMP) CAMPAIGN ..... 16
*4.6.1 LRS in White light mode ..... 17*
*4.6.2 LRS in filter mode (TB2) ..... 17*
*4.6.3 LRS in slit mode (TB2) ..... 17*
*4.6.4 LRS in monochromator mode (TB2) ..... 18*
*4.6.5 HCL stimulus (TB2) ..... 18*
*4.6.6 ORIEL stimulus (TB2) ..... 18*
*4.6.7 Zenith sky measurements (TB2) ..... 18*
*4.6.8 Rad/Irrad in sun mode (TB2) and Sun simulator at nadir (TB2) ..... 18*
*4.6.9 Rad/Irrad in nadir mode (TB2) and Sun simulator at sun (TB2) ..... 18*
*4.6.10 Sphere in nadir (TB2) ..... 19*

This document contains proprietary information of TNO-TPD.
All rights reserved.

*4.6.11 Sphere on sun port (TB2)* ..... *19*
4.7 TVC/GOME TB1 (NOMINAL-10 TEMP) CAMPAIGN ..... 19
*4.7.1 LRS in white light mode (TB1)* ..... *19*
*4.7.2 Oriel stimulus (TB1)* ..... *19*
*4.7.3 HCL stimulus (TB1)* ..... *20*
*4.7.4 Rad/Irrad in sun mode (TB1) and Sun simulator at nadir (TB1)* ..... *20*
*4.7.5 Rad/Irrad in nadir mode (TB1) and Sun simulator at sun (TB1)* ..... *20*
4.8 TVC/GOME TB3 (NOMINAL+10 TEMP) CAMPAIGN ..... 20
*4.8.1 LRS in white light mode (TB1)* ..... *20*
*4.8.2 HCL stimulus* ..... *21*
*4.8.3 Oriel stimulus (TB3)* ..... *21*
*4.8.4 Rad/Irrad in sun mode (TB3) and Sun simulator at nadir (TB3)* ..... *21*
*4.8.5 Rad/Irrad in nadir mode (TB3) and Sun simulator at sun (TB3)* ..... *21*
4.9 POST TEST AND PACKING ..... 21
4.10 NON-CONFORMANCE REPORTING ..... 22
4.11 DEVIATIONS FROM THE PROCEDURE ..... 22

**5. PROCEDURE SIGN-OFF SHEET ..... 23**

**6. PROCEDURE VARIATION SHEET ..... 24**

**7. GOME 2 NCR'S AFFECTING CALIBRATION EXECUTION (GAL INFO) ..... 25**

This document contains proprietary information of TNO-TPD.
All rights reserved.

# 1. Scope

This document presents the calibration execution procedure including the step-by-step procedure to be applied for the calibration of the Gome2 instrument.

This procedure is applicable for Gome2 FM1; FM2 and FM3

This document contains proprietary information of TNO-TPD.
All rights reserved.

# 2. Documents and Acronyms

## 2.1 Applicable documents

[AD1] Gome2 Calibration Requirements Specification
MO-RS-GAL-GO-0003
[AD2] Gome2 Calibration Plan
MO-PL-TPD-GO-0004
[AD3] Gome2 handling transportation and installation procedure
MO-PR-TPD-GO-0025, latest issue
[AD4] Gome2 emergency procedure for the VCF
MO-PR-TPD-GO-0029, latest issue
[AD5] Optical and mechanical alignment procedure
OPR020003
[AD6] List of applicable Gome2 FMx instrument NCR's
(To be provided by GAL)
[AD7] ATP report
MO-RP-TPD-GO-0037, latest issue
[AD8] TVC user manual

[AD9] Gome2 safety guideline for Calibration
MO-NT-GAL-GO-0025, latest issue

## 2.2 Reference documents

None

## 2.3 Acronyms

| Acronym | Description |
|---|---|
| AIRR | Ambient Irradiance/Radiance set-up |
| ATP | Automated Test Procedure |
| BEPNT | ODBH Bus Probe, New Technology |
| CTB | Command and Telemetry Block |
| DAPB | Data Acquisition and Processing Block |
| EGSE | Electrical Ground Support Equipment |
| ESA | European Space Agency |
| FMUSIM | Fast Multiplexer Unit Simulator |
| FPA | Focal Plane Assembly |
| GAL | Galileo Avionica |
| Gome | Global Ozone Monitoring Experiment |
| GSE | Ground Support Equipment |
| HCL | Hollow Cathode Lamp |
| LRS | Low Radiance Stimulus |
| MGSE | Mechanical Ground Support Equipment |
| NCR | Non Conformance Report |
| OGSE | Optical Ground Support Equipment |

This document contains proprietary information of TNO-TPD.
All rights reserved.

| Acronym | Description |
|---|---|
| PMD | Polarisation Measurement Device |
| PVS | Procedure Variation Sheet |
| QTH | Quartz Tungsten Hydrogen Lamp |
| SMU | Scan Mirror Unit |
| SLS | Spectral Light Source |
| TBC/TBD | To Be Confirmed / To Be Determined |
| TVC | Thermal Vacuum Chamber |
| VCF | Vacuum Calibration Facility |
| WLS | White Light Source |
| Xe | Xenon Lamp |

This document contains proprietary information of TNO-TPD.
All rights reserved.

# 3. Supporting procedures applicable during Calibration Execution

## 3.1 Operation and Handling Procedure

[AD3] Gome2 handling transportation and installation procedure
MO-PR-TPD-GO-0025, latest issue

## 3.2 Emergency Procedure

[AD4] Gome2 emergency procedure for the VCF
MO-PR-TPD-GO-0029, latest issue

## 3.3 Alignment Procedure Stimuli and MGSE

[AD5] Optical and mechanical alignment procedure
OPR020003

## 3.4 Operation of TVC

[AD8] TVC user manual

## 3.5 Switch on/off procedure for Gome2 (GAL ATP's)

### 3.5.1 Switch on procedure for Gome 2

| step | description |
|---|---|
| | **turn 19" rack on** |
| 1. | set red switch to OFF (0) |
| 2. | turn safety button at the bottom of the rack to the right |
| 3. | turn on switch that is located directly above the safety button (should be directed upwards now) |
| 4. | turn red switch to ON (1) |
| | **boot up the BEPNT** |
| 5. | push the power button on the rightmost PC (located under the desk) |
| 6. | login as 'administrator', password 'bent' |
| 7. | double-click icon 'start_bep.bat' |
| 8. | double-click icon 'BEP MMI' |
| 9. | wait for red indicators in the application window to become green |
| 10. | check all "acquiring panel" checkboxes to ON |
| | **boot up FMUSIM** |
| 11. | push the power button on the leftmost PC (located under the desk) |
| 12. | login as 'administrator', password 'bent' |
| 13. | double-click icon 'FMU SIM MMI' (ignore error message "FMU SIM Core not present" --> OK) |
| 14. | Start from menu bar: 'menu' --> 'core' --> 'start FMUSIM' (you have to click 'OK' twice) |
| 15. | Start from menu bar: 'menu' --> 'core' --> 'connect to FMUSIM' |
| 16. | in the application window, section 'panel', subsection 'input', click 'nominal 2' |
| 17. | in the application window, section 'panel', subsection 'output', click 'nominal 1' |

This document contains proprietary information of TNO-TPD.
All rights reserved.

| step | description |
|---|---|
| 18. | in the application window, section 'panel', subsection 'commands', click 'generation on' |
| 19. | in the application window, section 'panel', subsection 'commands', click 'acquisition on' |
| 20. | in the application window, section 'panel', subsection 'commands', click 'distribute on' |
| | **check 19" rack** |
| 21. | all numbers in the digital displays should be close to zero |
| | **boot up CTB** |
| 22. | push the power button on the PC (located under desk) |
| 23. | login as 'administrator', password 'bent' |
| 24. | double-click icon 'GOME2 CTB_MMI' |
| 25. | user: 'TPD_sidney' ; working dir: 'TPD_FM1 |
| 26. | Start from menu bar: 'menu' --> 'modes' --> 'online' → 'yes' |
| 27. | Start from menu bar: 'menu' --> 'tools' --> 'ATP' --> 'start' |
| 28. | ATP: 'Og_start' (no parameters) (Og_start will now appear in ATP status window: should be yellow now, i.e. the ATP is waiting) |
| 29. | Input: N and ICU on buttons on power supply →'yes' |
| | **19" rack** |
| 30. | push buttons 'EQ ON' and 'ICU ON' lift cap, push button, close cap (do nothing if buttons are already green) |
| 31. | ICU display should read: +/- 28.00 V +/- 0.43 A |
| 32. | EQT display should read: +/- 28.00 V +/- 0.00 A |
| 33. | Wait for approximately 1 minute |
| | **CTB** |
| 34. | Input: Operator name (use your personal first name for this) → 'OK' |
| 35. | Input: Context_FPA_cooling_enabled (y/n) → 'n' (safe mode) → 'OK'<br>Be sure about yes (FPA vacuum on!) |
| 36. | Input: Context_PMD_cooling_enabled (y/n) → 'n' (safe mode) → 'OK'<br>Be sure about yes (in vacuum only!) |
| 37. | Input: Context_PMD_flight_line_enabled (y/n) → 'n' (safe mode) → 'OK' |
| 38. | Input: Context_QTH_high_current_enabled (y/n) → 'n' (=360 mA); 'y' (=420 mA TBC) → 'OK' |
| 39. | Input: Continue with BIT (y/n) → shall be 'y' for each long measurement and/or frequently → 'OK'<br>BIT = Built In Test |
| 40. | Input: Enable monitoring (y/n) → 'y'→ 'OK' |
| 41. | Input: ATP 'Get_packet' in ATP status window. From the options 1=RTR, 2=RT, 3=RTE, select option 3 (i.e. everything) |
| 42. | Send Idle command (y/n) → 'y' → 'OK' |
| | **DAPB** |
| 43. | push the power button on the DAPB (below desk) |
| 44. | login and password are not needed |
| 45. | double-click icon 'GOME-2 DAPB Version 1.xx' |
| 46. | verify/set values in the DAPB start-up window:<br>Station type: DAPB-1<br>Instrument model: FM1 (1, 2 or 3)<br>Level: INSTRUMENT |

This document contains proprietary information of TNO-TPD.
All rights reserved.

| step | description | |
|---|---|---|
| | Company: | TPD |
| | User: | EZ |
| | Session description.: | short description of measurement, this description will appear in data file name |
| | **The subsystems are now ready for running calibration ATPs** | |

### 3.5.2 Change_context.tal

An GAL ATP for switching on/off FPA and PMD coolers. Use preferably the console.tal

### 3.5.3 History_decoder.tal

An GAL ATP for resetting the history decoder. This ATP is used for monitoring anomalies. This ATP shall be frequently executed (at least after each ATP)

### 3.5.4 Switch off procedure for Gome 2

| step | description |
|---|---|
| | **shut down CTB** |
| 1. | start ATP 'OG_stop' (menu bar: 'menu' --> 'tools' --> 'ATP' --> 'start') |
| 2. | wait for all ATP's to be stopped |
| 3. | set CTB to local mode: ('menu' --> 'modes' --> 'local') |
| 4. | exit CTB application: ('menu' --> 'file' --> 'exit') |
| 5. | shutdown CTB computer (power switch under the desk) |
| | **turn off 19" rack** |
| 6. | set red switch to OFF (0) |
| 7. | turn OFF the switch located directly above the big red safety button (should be directed downward now) |
| 8. | turn big red safety button to the left |
| | **shut down FMUSIM** |
| 9. | stop FMUSIM core ('menu' --> 'core' --> 'stop FMUSIM core' ; OK) |
| 10. | close FMUSIM application ('menu' --> 'file' --> 'close program') |
| 11. | shutdown FMUSIM computer (power switch under desk) |
| | **shutdown BEPNT** |
| 12. | close BEPNT application ('menu' --> 'file' --> 'exit') |
| 13. | shutdown BEPNT computer (power switch under desk) |

## 3.6 Gome2 console

This feature comprises initialisation/de-initialisation commands for Gome2, such as: FPA/PMD coolers on/off, set SMU angle etc.

The following procedure/settings are applicable (TBC):

1. Start Gome2_console.atp (see section 3.7)
2. Enter SMU angle [°]
3. Enter code for:

This document contains proprietary information of TNO-TPD.
All rights reserved.

| | |
|---|---|
| 200 | Gome2 LED FPA off |
| 201 | Gome2 LED FPA on |
| 300 | Gome2 LED PMD off |
| 301 | Gome2 LED PMD on |
| 400 | Gome2 SLS off |
| 401 | Gome2 SLS on |
| 500 | Gome2 WLS off |
| 501 | Gome2 WLS on |
| 600 | Gome2 FPA cooler off |
| 601 | Gome2 FPA cooler cold |
| 602 | Gome2 FPA cooler disable |
| 603 | Gome2 FPA cooler enable |
| 699 | Set target temperature FPA [K] |
| 700 | Gome2 PMD cooler off |
| 701 | Gome2 PMD cooler cold |
| 702 | Gome2 PMD cooler disable |
| 703 | Gome2 PMD cooler enable |
| 704 | Gome2 PMD cooler line 1 ground (do not use) |
| 705 | Gome2 PMD cooler line 2 in-flight |
| 800 | Set integration time (closest to Gome2 values is chosen) for FPA/PMD |
| 900 | Close Gome2 Shutter (sun port) |
| 901 | Open Gome2 Shutter |
| 902 | Shutter Gome2 disable |
| 903 | Shutter Gome2 enable |
| 998 | Gome 2 in stand-by (idle) mode |
| 999 | End |

## 3.7 Running ATP's

For information concerning ATP's (i.e. structure, settings etc) reference is made to [AD7].

| step | description |
|---|---|
| 1. | Start from CTB menu bar: 'menu' --> 'tools' --> 'ATP' --> 'start' |
| 2. | select ATP; enter 'Y'; click 'OK |

List of applicable ATP's (For information only!):

| ATP FM1 | OGSE | MGSE | port | TB | TD |
|---|---|---|---|---|---|
| AETA.tal | LRS | AETA | NADIR | ambient | TD1 |
| AIRR.tal | SunSim | AIRR | SUN | ambient | TD1 |
| BREWSTERSCAN.tal | LRS | TVC | NADIR | TB123 | TD1 |
| FILTERSCAN.tal | LRS | TVC | NADIR | TB2 | TD1 |
| IFOV .tal | LRS | TVC | NADIR | TB2 | TD1 |
| FELRAD.tal | FEL | TVC | NADIR | TB123 | TD1 |
| FELIRR.tal | FEL | TVC | SUN | TB123 | TD1 |

This document contains proprietary information of TNO-TPD.
All rights reserved.

| ATP FM1 | OGSE | MGSE | port | TB | TD |
|---|---|---|---|---|---|
| SUNRAD.tal | SunSim | TVC | NADIR | TB123 | TD1 |
| SUNIRR.tal | SunSim | TVC | SUN | TB123 | TD1 |
| LINEARITY.tal | INT-LED | TVC | NA | TB2 | TD12 |
| MONITOR.TAL | INT-LED | TVC/AETA/AIRR | NA | TB123 | TD12 |
| MONITOR.TAL | INT-WLS | TVC/AETA/AIRR | NA | TB123 | TD12 |
| MONITOR.TAL | INT-SLS | TVC/AETA/AIRR | NA | TB123 | TD12 |
| DIFFUSERMON.TAL | INT-SLS | TVC | NA | TB2 | TD1 |
| ORIEL.tal | LRS | TVC | NADIR | TB123 | TD1 |
| MONOSCAN .tal | LRS | NA | NADIR | TB2 | TD1 |
| HCL.tal | SLS-RAD | TVC | NADIR | TB123 | TD1 |
| SPHERE.tal | SPHERE-IRR | TVC | SUN | TB2 | TD1 |
| SPHERE.tal | SPHERE-RAD | TVC | NADIR | TB2 | TD1 |
| ZENITH.tal | ZENITH | TVC | NADIR | TB2 | TD1 |

## 3.8 Logging

Logging shall be applicable during the calibration campaign. The following log forms shall be used:

1. Hand written Log (free format)
2. Electronic Log (predefined format)
3. Measurement Log (tracking of measurements, i.e. ATP's), excerpt of the electronic log

Parameters to be frequently monitored and to be logged:

| parameter | value | remark |
|---|---|---|
| Instrument SLS voltage | 220±5V | check Low Voltage Mode |
| Instrument SLS scan mirror angle | 13° | FM |
| Instrument WLS current | Typical 360 mA | |
| Instrument temperature | FPA's<br>PMD's<br>Tref | Tref = Pre-disperser Prism Temperature |
| LRS SLS voltage | 220±5V | check Low Voltage Mode |
| Sun simulator output stability during AIRR | ±10% (TBC) | check output detector |
| TVC cold finger temperature | < -180°C | |
| TVC pressure | $<1x10^{-5}$ mbar | At $<1x10^{-4}$ mbar automatic switch-off of instrument |
| FPA vacuum pump pressure | $<1x10^{-5}$ mbar | |
| Radiator Cooler temperature | Typical 14°C | |
| QCM reading | As-is | |
| History decoder | - | At the end of each ATP or more frequently when necessary w.r.t. file size |
| Built In test | - | At OG-start |
| Other | TBD | |

## 3.9 Back up of DAPB data

The DAPB raw data, i.e. the archived measurements, shall be frequently archived (back-up) on CD-ROM identified with:

- Source (including Gome2 FMx)
- Date/Time
- Made by

This document contains proprietary information of TNO-TPD.
All rights reserved.

The obtained back-up shall be indicated in the logbook.

## 3.10 Quick Look

Quick look analysis shall be carried out:
- Inspection of DAPB Science Panels before execution of an ATP by dry-run of the ATP
- Inspection of DAPB Science Panels during ATP run
- Using conversion tool off line after execution of ATP

The parameters to be monitored for quick look analysis:
- General insight before/during/after ATP execution
- Signal to noise ratio
- Saturation (<50000 counts, typical 40000)
- Signal (>10000 counts)
- Instrument condition (temperatures, environment etc)

Before a set-up change (ambient to vacuum, OGSE change etc) a successful executed ATP is required.

This document contains proprietary information of TNO-TPD.
All rights reserved.

# 4. Step-by-step procedure

## 4.1 General

The following shall be taken into account prior and during Calibration Execution (not in order of importance):

| | Check |
|---|---|
| Operation and Handling Procedure [AD1] shall be present | ☐ |
| Emergency Procedure [AD4] shall be present | ☐ |
| Gome2 safety Procedure [AD9] shall be present | ☐ |
| Alignment Procedure [AD5] shall be present | ☐ |
| Stand-by operator for TVC and VCF shall be arranged | ☐ |
| SMS service for TVC alarm/warnings assigned | ☐ |
| Implications of GAL NCR's checked (section 7) | ☐ |
| Gome 2 automatic shut off system for TVC pressure installed and tested | ☐ |
| Never use PMD coolers = ON during ambient conditions and during –5°C calibration | |
| QCM software installed for monitoring | ☐ |
| Coffee Machine shall be present and working | ☐ |
| Log sheets shall be present | ☐ |

It shall be noted that the following step-by-step procedure wr.r.t. the sequence is not mandatory. Measurements order may be changed when convenient.

This document contains proprietary information of TNO. All rights reserved.

| Date: | Location: | Operator: | PA: |
|---|---|---|---|
| **FM identification:** | | | |

| No. | Calibration Step-description | Nominal Value | Actual Value | Reference | Remarks | P | N |
|---|---|---|---|---|---|---|---|
| **4.2** | **preparations** | | | | | | |
| 1. | Arrival of GOME2 EGSE and other equipment | OK | | | | | |
| 2. | Unpack EGSE and other equipment | OK | | | | | |
| 3. | Incoming inspection | OK | | | | | |
| 4. | Install EGSE and other equipment (CTB/DAPB/Pump/Cooler) | OK | | [AD1] | | | |
| 5. | Install sub-network to interconnect all EGSE systems | OK | | | | | |
| 6. | Install router | OK | | | Log IP adresses | | |
| 7. | Connect OAC to EGSE-sub network | OK | | | | | |
| 8. | Check network performance | OK | | | | | |
| 9. | Arrival of Gome2 FM1 | OK | | | | | |
| 10. | Unpack GOME2 | OK | | [AD1] | | | |
| 11. | Inspect GOME2 | OK | | | | | |
| 12. | Acceptance review | OK | | | Document in acceptance report | | |
| **4.3** | **Ambient block 1** | | | | | | |
| 13. | Install GOME2 on AETA MGSE | OK | | [AD1] | | | |
| 14. | Connect GOME2 to CTB | OK | | [AD1] | | | |
| 15. | Connect FPA vacuum pump | OK | | [AD1] | | | |
| 16. | Connect Radiant Cooler | OK | | [AD1] | | | |
| 17. | Switch on GOME2 | OK | | Section 3.5 | | | |
| 18. | Set detector temperature at TD1 and stabilise | OK | | Section 3.6 | PMD cooling must be OFF! | | |
| 19. | Perform functional test | OK | | [AD1] | | | |
| 20. | Mechanical alignment of AETA MGSE | OK | | [AD5] | | | |
| 21. | Install LRS in front of GOME2, nadir | OK | | [AD5] | | | |
| 22. | Set-up LRS in White Light Mode | OK | | | | | |
| 23. | Optical alignment of LRS with respect to GOME2 entrance slit | OK | | [AD5] | | | |
| 24. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 25. | AETA.TAL with QTH | OK | | Section 3.7 | | | |
| 26. | AETA.TAL with Xe | OK | | Section 3.7 | | | |
| 27. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 28. | Decision to proceed | OK | | | | | |
| **4.4** | **Ambient block 2** | | | | | | |

This document contains proprietary information of TNO. All rights reserved.

| Date: | Location: | Operator: | PA: |
|---|---|---|---|
| **FM identification:** | | | |

| No. | Calibration Step-description | Nominal Value | Actual Value | Reference | Remarks | P | N |
|---|---|---|---|---|---|---|---|
| 29. | Shut down GOME2 | OK | | Section 3.5 | | | |
| 30. | Install GOME2 on AIRR MGSE | OK | | [AD1] | | | |
| 31. | Connect GOME2 to CTB | OK | | [AD1] | | | |
| 32. | Connect FPA vacuum pump | OK | | [AD1] | | | |
| 33. | Connect Radiant Cooler | OK | | [AD1] | | | |
| 34. | Switch on GOME2 | OK | | Section 3.5 | | | |
| 35. | Set detector temperature at TD1 and stabilise | OK | | Section 3.6 | PMD cooling must be OFF! | | |
| 36. | Perform functional test | OK | | [AD1] | | | |
| 37. | Mechanical alignment of AIRR MGSE | OK | | [AD5] | | | |
| 38. | Sun simulator in sun ambient | OK | | | | | |
| 39. | Install SS in front of GOME2 | OK | | [AD5] | | | |
| 40. | Mechanical alignment of SS | OK | | [AD5] | | | |
| 41. | Optical alignment SS with respect to GOME2 sun port | OK | | [AD5] | | | |
| 42. | AIRR.TAL | OK | | Section 3.7 | | | |
| 43. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 44. | Decision to proceed | OK | | | | | |
| **4.5** | **Install GOME2 in TVC** | | | | | | |
| 45. | Shut down GOME2 | OK | | Section 3.5 | | | |
| 46. | Remove GOME2 from MGSE | OK | | [AD1] | | | |
| 47. | Install GOME2 on TVC MGSE | OK | | [AD1] | | | |
| 48. | Install Gome2 in TVC | OK | | [AD1] | | | |
| 49. | Connect GOME2 | OK | | [AD1] | | | |
| 50. | Connect FPA vacuum pump | OK | | [AD1] | | | |
| 51. | Connect Radiant Cooler | OK | | [AD1] | | | |
| 52. | Switch on GOME2 | OK | | Section 3.5 | | | |
| 53. | Perform functional test | OK | | [AD1] | | | |
| 54. | Mechanical alignment of MGSE | OK | | [AD5] | | | |
| 55. | Install LRS at Nadir window | OK | | [AD5] | | | |
| 56. | Close TVC door | OK | | [AD1] | | | |
| 57. | Check warning/alarm system | OK | | [AD4] | | | |
| 58. | Optical pre-alignment of LRS with respect to GOME2 entrance slit | OK | | [AD5] | | | |
| 59. | Switch Gome2 off | OK | | Section 3.5 | | | |
| 60. | Gome2 to vacuum | $>10^{-5}$ mbar | | [AD8] | | | |
| 61. | Start of Bake-out | 40°C | | [AD8] | | | |
| **4.6** | **TVC/Gome TB2 (nominal temp) campaign** | | | | | | |

This document contains proprietary information of TNO. All rights reserved.

| Date: | Location: | Operator: | PA: |
|---|---|---|---|
| **FM identification:** | | | |

| No. | Calibration Step-description | Nominal Value | Actual Value | Reference | Remarks | P | N |
|---|---|---|---|---|---|---|---|
| 62. | Start Cool down to TB2 | | | [AD8] | TB1/TB2/TB3 TBC | | |
| 63. | Switch on GOME2 when temperature has decreased below 303 K | <303K | | Section 3.5 | | | |
| 64. | Set detector temperature at TD1 and stabilise | OK | | Section 3.6 | TD1/TD2/TD3 TBC | | |
| 65. | Start PMD cooling and wait for stabilisation | OK | | Section 3.6 | High power mode | | |
| 66. | Perform functional test and compare results | OK | | | | | |
| 67. | LRS alignment | OK | | [AD5] | | | |
| 68. | Optical alignment (check + fine-tuning) of LRS with respect to GOME2 entrance slit | OK | | [AD5] | | | |
| **4.6.1** | **LRS in White light mode** | | | | | | |
| 69. | Change detector temperature to TD2 and stabilise | OK | | Section 3.6 | | | |
| 70. | LINEARITY.TAL | OK | | Section 3.7 | | | |
| 71. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 72. | Change detector temperature to TD1 and stabilise | OK | | Section 3.6 | | | |
| 73. | LINEARITY.TAL | OK | | Section 3.7 | | | |
| 74. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 75. | DIFFUSERMON.TAL | OK | | Section 3.7 | Diffuser monitoring | | |
| 76. | BREWSTERSCAN.TAL with QTH | OK | | Section 3.7 | Includes ETA/ZETA | | |
| 77. | BREWSTERSCAN.TAL with Xe | OK | | Section 3.7 | | | |
| 78. | MONITOR.TAL | OK | | Section 3.7 | Includes ETA/ZETA | | |
| **4.6.2** | **LRS in filter mode (TB2)** | | | | | | |
| 79. | Set-up LRS in filter mode | OK | | | | | |
| 80. | FILTERSCAN.TAL with Xe | OK | | Section 3.7 | Dispersion and cross dispersion | | |
| 81. | FILTERSCAN.TAL with QTH | OK | | Section 3.7 | | | |
| 82. | MONITOR.TAL | OK | | Section 3.7 | | | |
| **4.6.3** | **LRS in slit mode (TB2)** | | | | | | |
| 83. | Set-up LRS in slit mode | OK | | | | | |
| 84. | IFOV.TAL with Xe | OK | | Section 3.7 | | | |
| 85. | IFOV_.TAL with QTH | OK | | Section 3.7 | | | |
| 86. | MONITOR.TAL | OK | | Section 3.7 | | | |

This document contains proprietary information of TNO. All rights reserved.

| Date: | Location: | Operator: | PA: |
|---|---|---|---|
| **FM identification:** | | | |

| No. | Calibration Step-description | Nominal Value | Actual Value | Reference | Remarks | P | N |
|---|---|---|---|---|---|---|---|
| **4.6.4** | **LRS in monochromator mode (TB2)** | | | | | | |
| 87. | Set-up LRS in monochromator mode | OK | | | | | |
| 88. | MONOSCAN.TAL | OK | | Section 3.7 | For straylight | | |
| 89. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 90. | Decision to proceed | OK | | | | | |
| **4.6.5** | **HCL stimulus (TB2)** | | | | | | |
| 91. | Set-up HCL stimulus | OK | | | | | |
| 92. | HCL.TAL | OK | | Section 3.7 | For FPA wavelength calibration | | |
| 93. | MONITOR.TAL | OK | | Section 3.7 | | | |
| **4.6.6** | **ORIEL stimulus (TB2)** | | | | | | |
| 94. | Set-up Oriel stimulus | OK | | | | | |
| 95. | ORIEL.TAL | OK | | Section 3.7 | For PMD wavelength calibration | | |
| 96. | MONITOR.TAL | OK | | Section 3.7 | | | |
| **4.6.7** | **Zenith sky measurements (TB2)** | | | | | | |
| 97. | Install Zenith Sky set-up | OK | | [AD5] | | | |
| 98. | Optical alignment of Zenith Sky set-up | OK | | [AD5] | | | |
| 99. | ZENITH.TAL | OK | | Section 3.7 | | | |
| 100. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 101. | Decision to proceed | OK | | | | | |
| **4.6.8** | **Rad/Irrad in sun mode (TB2) and Sun simulator at nadir (TB2)** | | | | | | |
| 102. | Install Rad/Irrad Set-up | OK | | [AD5] | | | |
| 103. | Setup Rad/Irrad in Sun mode | OK | | [AD5] | | | |
| 104. | Align Rad/Irrad Set-up in Sun mode | OK | | [AD5] | | | |
| 105. | Install Sun Simulator | OK | | [AD5] | | | |
| 106. | Set-up Sun Simulator at Nadir window | OK | | [AD5] | | | |
| 107. | Align Sun Simulator | OK | | [AD5] | | | |
| 108. | FELRAD.TAL | OK | | Section 3.7 | | | |
| 109. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 110. | SUNRAD.TAL | OK | | Section 3.7 | | | |
| 111. | Decision to proceed | OK | | | | | |
| **4.6.9** | **Rad/Irrad in nadir mode (TB2) and Sun simulator at sun (TB2)** | | | | | | |
| 112. | Set-up Rad/Irrad in Nadir mode | OK | | [AD5] | | | |
| 113. | Align Rad/Irrad Set-up in Nadir mode | OK | | [AD5] | | | |
| 114. | Set-up Sun Simulator at Sun window | OK | | [AD5] | | | |
| 115. | Align Sun Simulator | OK | | [AD5] | | | |

This document contains proprietary information of TNO. All rights reserved.

| Date: | Location: | Operator: | PA: |
|---|---|---|---|
| **FM identification:** | | | |

| No. | Calibration Step-description | Nominal Value | Actual Value | Reference | Remarks | P | N |
|---|---|---|---|---|---|---|---|
| 116. | FELIRR.TAL | OK | | Section 3.7 | | | |
| 117. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 118. | SUNIRR.TAL | OK | | Section 3.7 | | | |
| 119. | Decision to proceed | OK | | | | | |
| **4.6.10** | **Sphere in nadir (TB2)** | | | | | | |
| 120. | Install TVSPH in front of Nadir window | | | [AD5] | | | |
| 121. | Align TVSPH with respect to GOME2 entrance slit | OK | | [AD5] | | | |
| 122. | SPHERE_TAL | OK | | Section 3.7 | | | |
| 123. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 124. | Decision to proceed | OK | | | | | |
| **4.6.11** | **Sphere on sun port (TB2)** | | | | | | |
| 125. | Install TVSPH in front of Sun window | OK | | [AD5] | | | |
| 126. | Align TVSPH with respect to GOME2 sun port | OK | | [AD5] | | | |
| 127. | SPHERE.TAL | OK | | Section 3.7 | | | |
| 128. | MONITOR.TAL | OK | | Section 3.7 | Including SLS over diffuser | | |
| 129. | Decision to proceed | OK | | | | | |
| **4.7** | **TVC/Gome TB1 (nominal-10 temp) campaign** | | | | | | |
| 130. | Switch off PMD cooling | OK | | | During –10 campaign no PMD cooling is allowed! | | |
| 131. | Change TB temperature and stabilise | OK | | | | | |
| 132. | Install LRS | OK | | [AD5] | | | |
| 133. | Optical pre-alignment of LRS with respect to GOME2 entrance slit | OK | | [AD5] | | | |
| 134. | Optical alignment (check + fine-tuning) of LRS with respect to GOME2 entrance slit | OK | | [AD5] | | | |
| **4.7.1** | **LRS in white light mode (TB1)** | | | | | | |
| 135. | Set-up LRS in White light mode | OK | | | | | |
| 136. | BREWSTERSCANTAL with QTH | OK | | Section 3.7 | Eta/Zeta only | | |
| 137. | BREWSTERSCANTAL with Xe | OK | | Section 3.7 | | | |
| 138. | MONITOR.TAL | OK | | Section 3.7 | | | |
| **4.7.2** | **Oriel stimulus (TB1)** | | | | | | |
| 139. | Set-up Oriel Monochromator | OK | | | | | |
| 140. | ORIEL.TAL | OK | | Section 3.7 | | | |
| 141. | MONITOR.TAL | OK | | Section 3.7 | | | |

This document contains proprietary information of TNO. All rights reserved.

| Date: | Location: | Operator: | PA: |
|---|---|---|---|
| **FM identification:** | | | |

| No. | Calibration Step-description | Nominal Value | Actual Value | Reference | Remarks | P | N |
|---|---|---|---|---|---|---|---|
| **4.7.3** | **HCL stimulus (TB1)** | | | | | | |
| 142. | Set-up HCL stimulus | OK | | | | | |
| 143. | HCL.TAL | OK | | Section 3.7 | | | |
| 144. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 145. | Decision to proceed | OK | | | | | |
| **4.7.4** | **Rad/Irrad in sun mode (TB1) and Sun simulator at nadir (TB1)** | | | | | | |
| 146. | Install Rad/Irrad Set-up | OK | | [AD5] | | | |
| 147. | Set-up Rad/Irrad in Sun mode | OK | | [AD5] | | | |
| 148. | Align Rad/Irrad Set-up in Sun mode | OK | | [AD5] | | | |
| 149. | Install Sun Simulator | OK | | [AD5] | | | |
| 150. | Set-up Sun Simulator at Nadir window | OK | | [AD5] | | | |
| 151. | Align Sun Simulator | OK | | [AD5] | | | |
| 152. | FEL_ABS.TAL | OK | | Section 3.7 | | | |
| 153. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 154. | SUSI.TAL | OK | | Section 3.7 | | | |
| **4.7.5** | **Rad/Irrad in nadir mode (TB1) and Sun simulator at sun (TB1)** | | | | | | |
| 155. | Set-up Rad/Irrad in Nadir mode | OK | | [AD5] | | | |
| 156. | Align Rad/Irrad Setup in Nadir mode | OK | | [AD5] | | | |
| 157. | Set-up Sun Simulator at Sun window | OK | | [AD5] | | | |
| 158. | Align Sun Simulator | OK | | [AD5] | | | |
| 159. | FEL_ABS.TAL | OK | | Section 3.7 | | | |
| 160. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 161. | SUSI.TAL | OK | | Section 3.7 | | | |
| 162. | Decision to proceed | OK | | | | | |
| **4.8** | **TVC/Gome TB3 (nominal+10 temp) campaign** | | | | | | |
| 163. | Change TB temperature and stabilise | OK | | | | | |
| 164. | Switch on PMD cooling | OK | | | | | |
| 165. | Install LRS | OK | | [AD5] | | | |
| 166. | Optical pre-alignment of LRS with respect to GOME2 entrance slit | OK | | [AD5] | | | |
| 167. | Optical alignment (check + fine-tuning) of LRS with respect to GOME2 entrance slit | OK | | [AD5] | | | |
| **4.8.1** | **LRS in white light mode (TB1)** | | | | | | |
| 168. | Set-up LRS in White light mode | OK | | | | | |
| 169. | BREWSTERSCAN.TAL with QTH | OK | | Section 3.7 | Eta/Zeta only | | |
| 170. | BREWSTERSCAN.TAL with Xe | OK | | Section 3.7 | | | |

This document contains proprietary information of TNO. All rights reserved.

| Date: | Location: | Operator: | PA: |
|---|---|---|---|
| **FM identification:** | | | |

| No. | Calibration Step-description | Nominal Value | Actual Value | Reference | Remarks | P | N |
|---|---|---|---|---|---|---|---|
| 171. | MONITOR.TAL | OK | | Section 3.7 | | | |
| **4.8.2** | **HCL stimulus** | | | | | | |
| 172. | Set-up HCL stimulus (TB3) | OK | | | | | |
| 173. | HCL.TAL | OK | | Section 3.7 | | | |
| 174. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 175. | Decision to proceed | OK | | | | | |
| **4.8.3** | **Oriel stimulus (TB3)** | | | | | | |
| 176. | Set-up oriel Monochromator | OK | | | | | |
| 177. | ORIEL.TAL | OK | | Section 3.7 | | | |
| 178. | MONITOR.TAL | OK | | Section 3.7 | | | |
| **4.8.4** | **Rad/Irrad in sun mode (TB3) and Sun simulator at nadir (TB3)** | | | | | | |
| 179. | Install Rad/Irrad Set-up | OK | | [AD5] | | | |
| 180. | Set-up Rad/Irrad in Sun mode | OK | | [AD5] | | | |
| 181. | Align Rad/Irrad Set-up in Sun mode | OK | | [AD5] | | | |
| 182. | Install Sun Simulator | OK | | [AD5] | | | |
| 183. | Set-up Sun Simulator at Nadir window | OK | | [AD5] | | | |
| 184. | Align Sun Simulator | OK | | [AD5] | | | |
| 185. | FELRAD.TAL | OK | | Section 3.7 | | | |
| 186. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 187. | SUNRAD.TAL | OK | | Section 3.7 | | | |
| **4.8.5** | **Rad/Irrad in nadir mode (TB3) and Sun simulator at sun (TB3)** | | | | | | |
| 188. | Set-up Rad/Irrad in Nadir mode | OK | | [AD5] | | | |
| 189. | Align Rad/Irrad Setup in Nadir mode | OK | | [AD5] | | | |
| 190. | Set-up Sun Simulator at Sun window | OK | | [AD5] | | | |
| 191. | Align Sun Simulator | OK | | [AD5] | | | |
| 192. | FELIRR.TAL | OK | | Section 3.7 | | | |
| 193. | MONITOR.TAL | OK | | Section 3.7 | | | |
| 194. | SUNIRRTAL | OK | | Section 3.7 | | | |
| 195. | Decision to proceed | OK | | | | | |
| **4.9** | **Post test and packing** | | | | | | |
| 196. | Perform functional test | OK | | | | | |
| 197. | Shut down GOME2 | OK | | Section 3.5 | | | |
| 198. | Pack GOME2 instrument EGSE and other equipment | OK | | [AD1] | | | |
| 199. | Post Test Review (PTR) | OK | | | | | |

This document contains proprietary information of TNO. All rights reserved.

## 4.10 Non-conformance Reporting

In failure cases, non-conformance reporting shall follow prescriptions of the Product Assurance Plan.

## 4.11 Deviations from the Procedure

Deviations are acceptable as long as test purposes and objectives remain valid. In any case deviations need to be introduced via the “Procedure Variation Sheet”. A form sheet is provided in section 6.

Where a non-conformance was the reason for a procedure deviation, a non-conformance report needs to be generated separately.

This document contains proprietary
information of TNO. All rights reserved.

## 5. Procedure sign-off sheet

The identified test article has been successfully calibrated in accordance with this procedure and all open items and non-conformance reports are closed except those listed here below:

Date and signatures of:
Test Manager:
Product Assurance:
Customer:

This document contains proprietary information of TNO. All rights reserved.

## 6. Procedure Variation Sheet

| | | | | | | |
|---|---|---|---|---|---|---|
| | **TNO-TPD** | **Procedure Variation Sheet** | | | | **Procedure No.**<br>**Date**<br>**Issue:**<br>**Sheet** |
| | **Project: Gome-2 Instrument Calibration** | | | | | **PVS No.** |
| **Cal Step No.** | **Test Step description** | **Nominal Value** | **Actual Value** | **P** | **N** | **Remarks** |
| | | | | | | |
| | **Date:** | **Test Location:** | **Operator:** | **PA:** | **Customer:** | |

This document contains proprietary information of TNO-TPD.
All rights reserved.

# 7. Gome 2 NCR's affecting Calibration Execution (GAL info)

The following pages reflect the GAL raised NCR's which should be taken into account during calibration.
The following pages are incorporated as-is with references:

FM1: e-mail from GAL (B. Ricciarelli) dated 8 march 2002

This document contains proprietary information of TNO-TPD.
All rights reserved.

This document contains proprietary information of TNO-TPD.
All rights reserved.